Coherent Analytical Computing Environment

Presented to

Marine Air Board

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By

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(**C**oherent **A**nalytical **C**omputing **E**nvironment)

CACE

"A Command-Level Decision Support Intra-system"

(CDSI)

A Generic Set of Modular Tools designed to create an **analytic shared data environment** integrated **across functional domains**. *CACE* will be linked laterally and vertically by networks of pro-active intelligent applications and agents, enabling reduction in Task Loading, as well as **facilitating improved Decision Making, Safety and Efficiency at all Operational**

What Does It Mean?

- **A Generic Set of Modular Tools**
  - Plug into existing Databases.
  - Can upload resource data and work autonomously when required (i.e. enroute to deployment site).
  - Reconnect and synchronize on arrival.
- **Analytical Share Data**
  - Processed data and information contribute to Common Operational Picture available wherever/whenever required.
- **Across functional domains**
  - Command, Operations and Maintenance continuous contribution to real time Common Operational Picture and Operational Risk Management.
  - Proposed solutions always consider Intent derived guidance with consideration for capabilities and constraints of all resources

CACE Modular Tools

- **Schedules Negotiated by Ant-based Planners (SNAP)**
  - Builds and repairs fully-detailed flight schedules in coordination with Maintenance for any planning horizon, without losing sight of command objectives, providing new opportunities to explore and manage alternative futures (1/10 to 1/100 of current time).
- **MAintenance PLANning Tool (MAPLANT)**
  - Builds and repairs fully-detailed Maintenance schedules for any planning horizon, without losing sight of command objectives, providing new opportunities to explore and manage alternative futures (1/10 to 1/100 of current time).
- **Mission Sensitive Resumes (MSR)**
  - Provides critical, prioritized information and recommendations (courses of action) to intelligently aid multi-level decision making to effectively plan and execute operations and maintenance within the framework of specific parameters, organizational goals and commander's intent
  - **Electronic Aircraft Discrepancy Book** (**eADB**), made available as developmental spin-off.

Underlying Structure

- Data Warehouse
  - Automates labor-intensive reports (Currently for Maintenance, but not restricted in concept).
  - Provides on-line real-time data for decision-makers.
  - Web enabled, widely accessible.
  - Core component of integrated data access for generation of Common Operational Picture and Decision Support.

(**C**ommand-level **D**ecision **S**upport **I**ntra-system)

CACE CDSI Attributes

- ***Knows the situation***
- ***Accepts guidance at any level of specificity***
- ***Obeys the law and FLAGS inconsistencies***
- ***Recommends Solutions***
- ***Compares results to guidance***

Provides

New CONOPS opportunities based upon:

- **Intent-based planning / re-planning**
- **Multiple types of guidance**
- **Cross-functional negotiations**
- **Alternate futures, pushback on guidance**

Based on

Advanced technology enablers:

- **Cooperative negotiation**
- **Good-enough / soon-enough planning**

Status as of June 2002

- Initial prototype of CACE Toolset
  - AV-8 elements of 11th and 31st MEUs.
- Includes
  - SNAP (Ops)
  - MAPLANT (Maint)
  - Electronic Aircraft Discrepancy Book
    - eADB, Ops and Maint
  - Data Ware House with automated NAMP Reports

Current Status

- MAG-13 Garrison units update with deployed equivalent hardware & software modules, and associated training.
- Final phase of ACTD development (Aug 02-Mar 03)
  - *Final developmental phase includes near real time execution decision support, advanced local architecture with deployable capability, "bug" fixes for ACTD residuals*
- Incremental Residual & Transition Planning

Future of CACE

- Initiated Technology Transfer Agreement (TTA) with JSF Lockheed Martin (Aug 02)
- Baseline CACE Tools
  - Continue development as FY 03 ONR, Future Naval Capabilities (FNC) project CARTE
    - Comprehensive Analytical Real-Time Execution
    - Knowledge Superiority & Assurance Spike

Future of CACE (cont)

- USMC opportunity
  - Continue to drive CACE technology development
  - Includes hardening/proliferation across platforms of CACE leave behind (linked with CARTE).
  - Support and transition (POM issue) of CARTE expanded development capabilities (MEU/MEB ACE).
  - Track and influence JSF Autonomic Logistic Information System (ALIS) TTA.
- <u>Requires a USMC Transition Manager</u>
  - Assignment required **ASAP**

USMC Transition Manager ?

Backups

CACE CONOPS

CACE Computer:
Warehouse/NAMP/SNAP/MAPLANT
MSAR/SARA

SARA Computer

Ship's LAN

ABC **Functional Applicatio**

Operations Duty Officer
SNAP/SARA
MSAR

E-Signature Verification

-The ODO node will be responsible for capturing (via ODO manual entry) actual schedule execution details and any changes. After certification it will pass update information for the SARA database update to the OPS Clerk SARA node and notify the Schedule Writer node of changes. In addition the ODO node will have MSAR functionality for ODO/Pilot pre/post briefing ready room review of assigned aircraft.

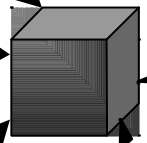
-The Ops Clerk node (SARA only laptop), will receive updates and use the information as normal to correct data, manage log books, etc.

Ops Clerks
SARA

Main Material Control Officer

E-Signature Verification

Data Warehouse
NAMP reports
MAPLANT
MSAR



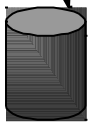
-The MMCO node will function as warehouse server to the ACE NALCOMIS host. It will maintain the warehouse database and produce the current list of NAMP reports. It will provide MAPLANT data files to SNAP via a shared drive on the LAN and data to the MSAR application at both the Schedule writer and Operations Duty Officer nodes. It will provide for monthly planning of scheduled, calendar and usage-based maintenance, allow assessment of daily and monthly schedule supportability and impact on the monthly plan. MSAR will assist in rapid aircraft MAF review,

-The Ops Schedule Writer node will function as the primary daily, weekly and long-range scheduling and planning tool. It will draw SARA data from the designated SARA database location (SARA Laptop or shared drive on LAN), data files from MAPLANT and

Schedule Writer
SNAP/SARA

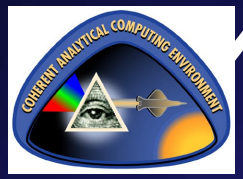
E-Signature Verification

Ship's/ Sqn LAN Server



NALCOMIS Host

SNAP, SARA, SHARP



Active Decision Support via Planning Tools

Passive Decision Support via Reportng Tools

Database Access and Management

Coordinated Operations and Maintenance Mgt

Mission-Sensitive Advice and Review

SNAP

Long Range Projection

Exploring and Evaluating Alternative Futures

Intelligent *Repair* of Schedules following Human Guidance

Intelligent *Generation of* Schedules following Human Guidance

SARA
SHARP

Manual Schedule Editing & Recordkeeping

Report Generation

Operational Risk Management Aids

SOP Checks: Flags inconsistencies, allows overrides

Consistency Checks: "Follow the Law"

Risk Evaluation (SARA only)

Simple Data Entry Validation

Flight Logs

Data Repository

USMC Development and Transition

FY02	FY03	FY04	FY05	FY06

CACE Development

CACE Residual

CACE Transitions

CARTE Development

CARTE Transitions

MAG-13

All MAG-13

Assessment

MAG- 41

3rd MAW

All AV-8

CACE & CARTE FUNDING

CACE	FY02	FY03	FY04	FY05
OSD $1.85 Mil	$5.231 Mil	?	?	
USMC $.425 Mil				
JSF $2.155 Mil		Residual Support for MAG-13		
ONR $.801 Mil				
USMC $1 Mil		$500K	$500K	
DARPA $6.5 Mil	$8.5 Mil Leveraged			
NASA $2 Mil				
CARTE				
ONR Future Naval Capabilities Knowledge Superiority and Assurance		Development Proposal $7.5 Mil		

Current Date